Effective strategies for managing your research data - beginners session

Clair Castle, cmc32@cam.ac.uk
Lauren Cadwallader, lc340@cam.ac.uk

Office of Scholarly Communication
Research Data Management Facility

3 September 2018

Research Data

Some housekeeping information:

1. Today: mixture of activities and us talking
2. Ask questions whenever you want
3. There is no fire alarm testing
4. Rule: everything you say remains confidential
5. Slides will be made available
6. Feedback form

Research Data

Aims of today's workshop:

- Develop effective research data management skills
- Increase awareness of challenges around data management
- Improve awareness of significance of data management in context of reproducibility and research sharing
- Raise awareness of University data support services for researchers

Plan for today:

1: Data backup and file sharing strategies

2: File sharing basics

3: Data organisation

4: Managing personal and sensitive data

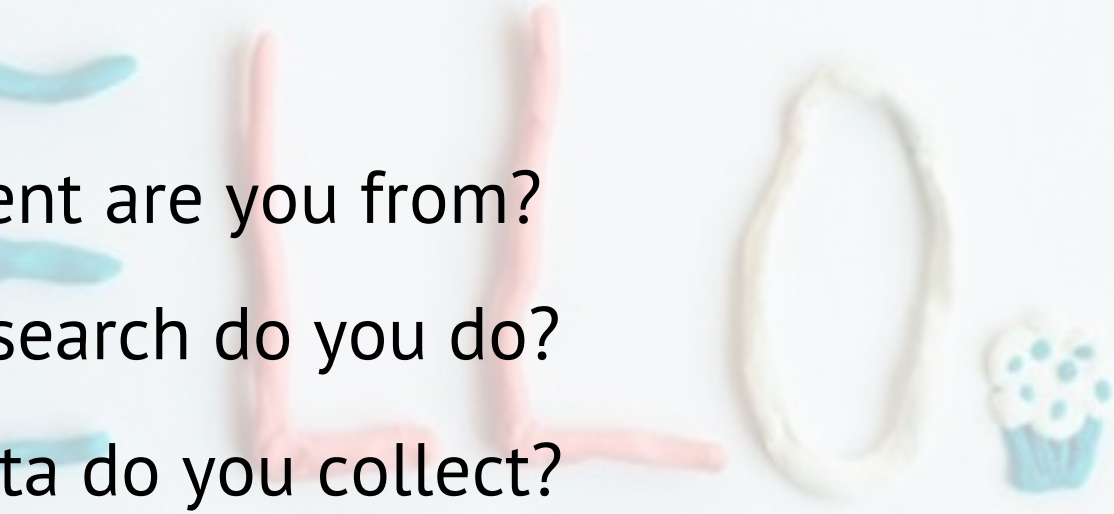
5: Data sharing whys and hows

Research Data

To start with…

…let's get to know each other – talk to a person you don't know for 2 mins and exchange information:

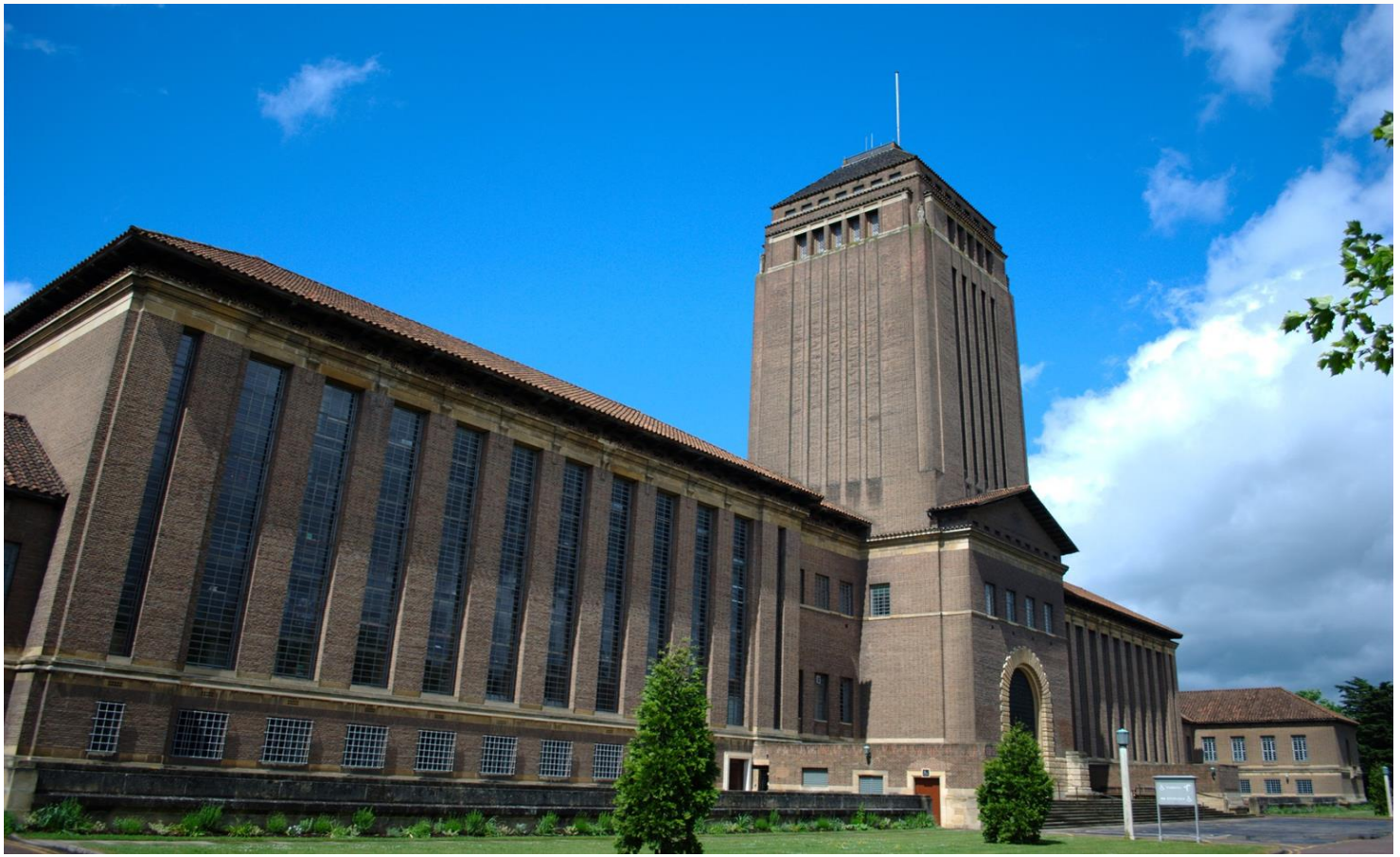
- Who are you?
- Which department are you from?
- What type of research do you do?
- What kind of data do you collect?
- Why did you come here today?



After 2 minutes introduce each other to the group

Who are we?

The Office of Scholarly Communication



Copyright: http://www.archdaily.com/408244/cambridge-university-library-landscape-design-competition

Team of 16, headed by Dr Danny Kingsley, based at the University Library, a centre of digital preservation.

Research Data

What does the Office of Scholarly Communication do?

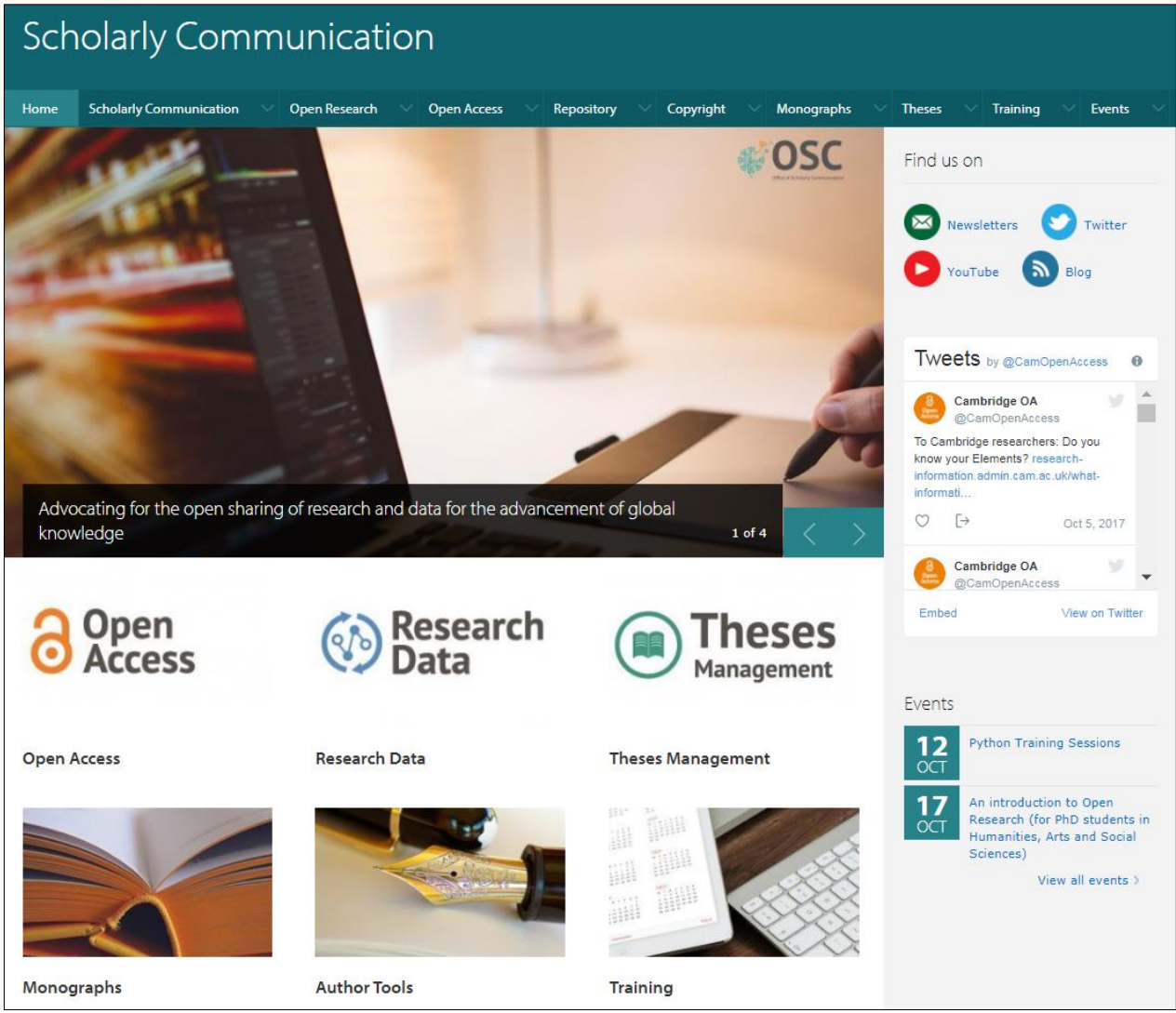
We help researchers communicate their scholarly outputs

Research Data

OSC

Office of Scholarly Communication

- Open Access
- Research Data Management
- Apollo
- Thesis Management
- Training



Research Data


What is research data management?

Research Data Management (RDM)

ORGANISING

STORING

ARCHIVING

SHARING

‘Data’ can mean a lot…

- Raw instrument readings
- Processed data
- Analysed data
- Genomic data
- Microscopic photos, western blot images and measurement
- Spreadsheets
- Videos
- Surveys and interviews
- Field notes
- Maps
- Lab books
- Physical samples
- Protocols

It’s basically anything you produce in the course of your research!

Research Data

FAIR data

Findable

- easily discoverable

Accessible

- no restriction to access

Interoperable

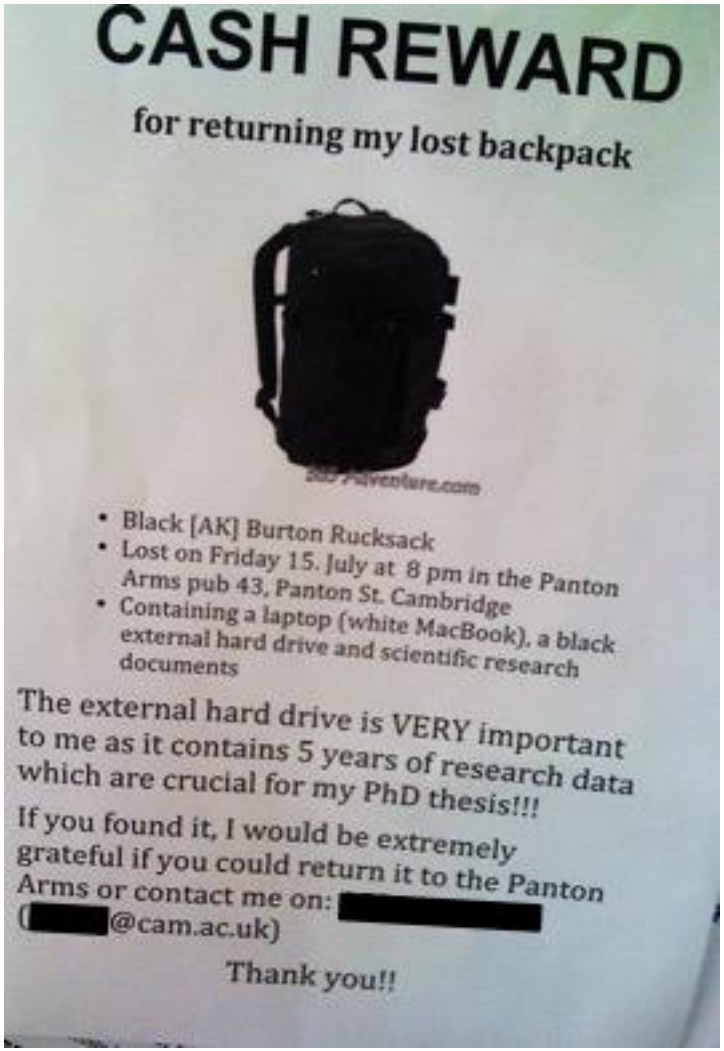
- doesn’t rely on one specific type of software

Reusable

- is clearly licensed

1. Data backup and file sharing strategies

Disastrous data loss...



Credit: Peter Murray-Rust, http://blogs.ch.cam.ac.uk/pmr/2011/08/01/why-you-need-a-data-management-plan/, August 2011, CC-BY

Research Data


How much of your data would you lose if...?

How much of your data would you lose if...?

- your laptop got stolen
- your lab burnt down
- you lost your USB stick
- your portable hard drive got damaged
- Your stuff on Dropbox / Google Drive disappeared

How much data would you lose?

How could this data loss have been prevented?

Research Data

Backup strategies:

- Departmental backup system
- External drives
- Online backups

- At least two backups, at two different locations

Research Data

At least 2 backups at 2 locations:

Store at home!

Copy ASAP!

Your departmental server

Free software to manage backups (there is plenty of free software):
http://www.2brightsparks.com/download-syncbackfree.html

Research Data

What is your name?

Hello, my name is...

Hello, my name is...
“FLASHDRIVE”

Hello, my name is “Hooray for Mammoths”

Hello, my name is...
“LCadwallader(lc340)”

That’s my name too!

Research Data

2. File sharing basics

File sharing

- E-mail
- University of Cambridge solutions https://www.uis.cam.ac.uk/projects/storage-strategy/storage-services
  - Research data storage, e.g. cold storage
  - Cloud storage, e.g. OneDrive
- (Secure) File Transfer Protocol – (S)FTP: set up by your IT support
- Local file servers
- Private cloud solutions – be cautious!

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Beware of the cloud

Google services Terms of Use:

When you upload, submit, store, send or receive content to or through our Services, you give Google (and those we work with) a worldwide license to use, host, store, reproduce, modify, create derivative works (such as those resulting from translations, adaptations or other changes we make so that your content works better with our Services), communicate, publish, publicly perform, publicly display and distribute such content. The rights you grant in this license are for the limited purpose of operating, promoting, and improving our Services, and to develop new ones. This license continues even if you stop using our Services (for example, for a business listing you have added to

https://www.google.com/intl/en/policies/terms/

Research Data

Cloud services comparison

	OneDrive for Business	for Business	@cam
Space included	1 TB	Unlimited	Unlimited
Price (per annum)	Free	£75 (+VAT)	Free
File history	90 days	30 days	Unlimited
Where are files stored?	Within UK	Within EU	Anywhere

Full comparison: https://help.uis.cam.ac.uk/service/supporting-research/servers-data-storage-and-backup/data-storage/individual-storage

Research Data

3. Data organisation

Physical samples

Lauren Cadwallader

Whether in the lab or field you need to think about good data management from the very beginning

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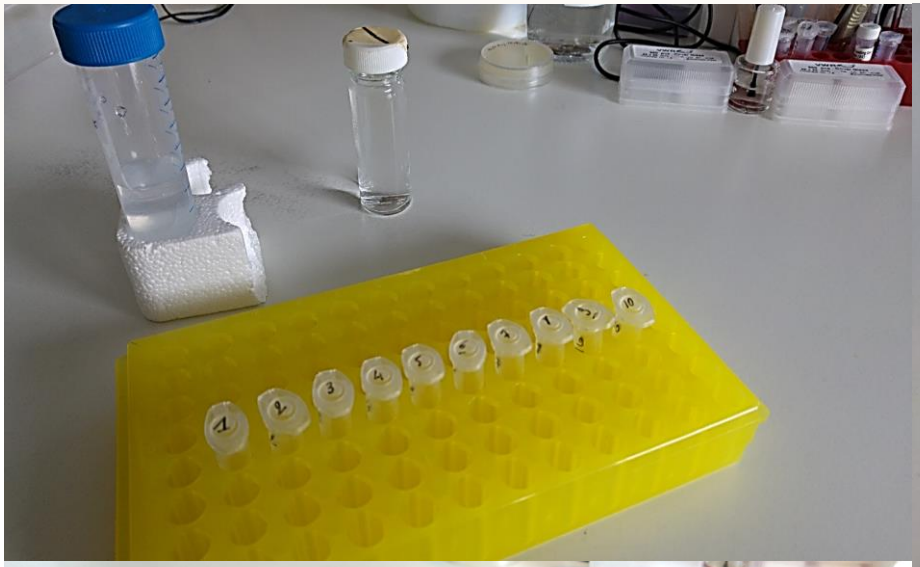
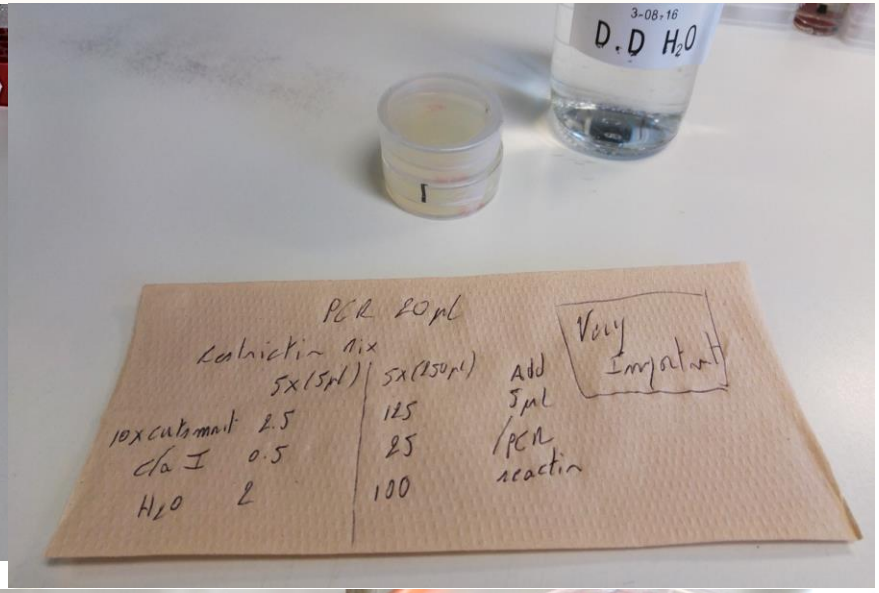
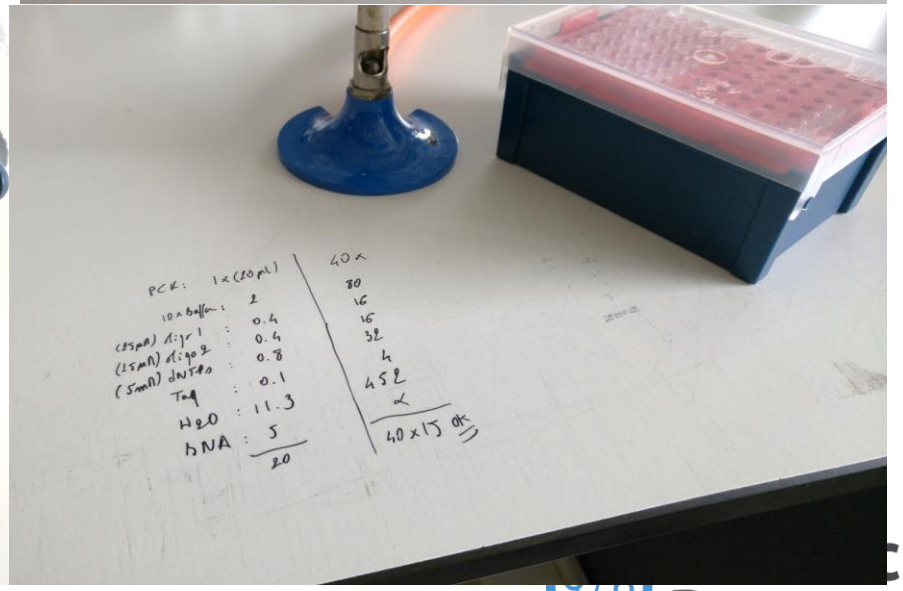
Physical samples





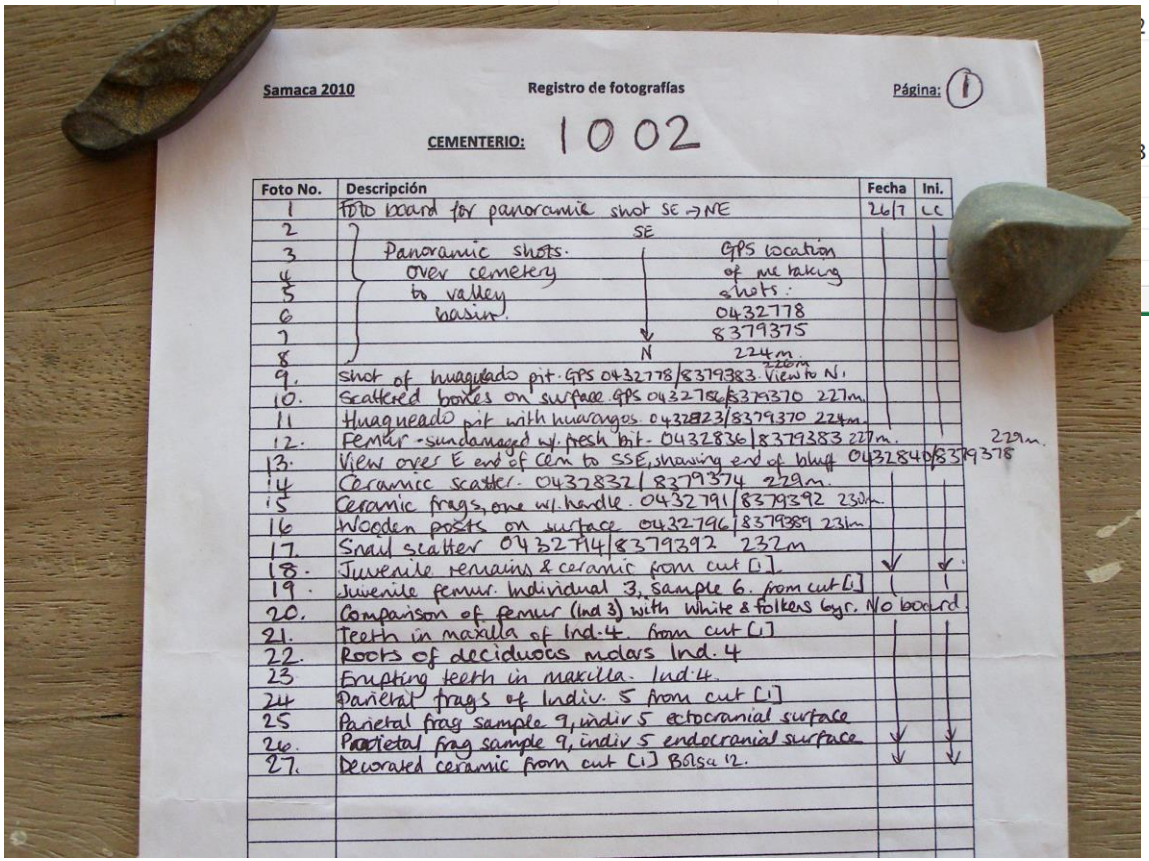


Vincent Gaggioli

Data

Digitise your handwritten notes!

	A	B	C	D	E
1	**Box #1**				
2	**Name of the sample**	**date in lab book**	**Samples left (if multiple samples)**	**Sample size**	**Notes**
3					
4	**Fibroblasts protein extract**	23/03/2014	1	~40ul	Concentration: 0.6mg/ml
5	**Fibroblasts protein extract**	05/04/2014	7	~40ul	Concentration: 0.65mg/ml
6	**Fibroblast protein extract for mass spec**	19/08/2014	4	~50ul	Difficulties measuring concentration
7	**Fibroblast RNA extract**	20/09/2014	12	~10ul	Concentration: 80ng/ul
				~10 ul	Concentration: 100ng/ul; excellent prep
				~5ul	Abcam: ab8227 LOT: GR47300 Concentration: 0.6mg/ml Rabbit polyclonal IgG



Lauren Cadwallader, PhD fieldwork photo register

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Physical samples need to be managed as well

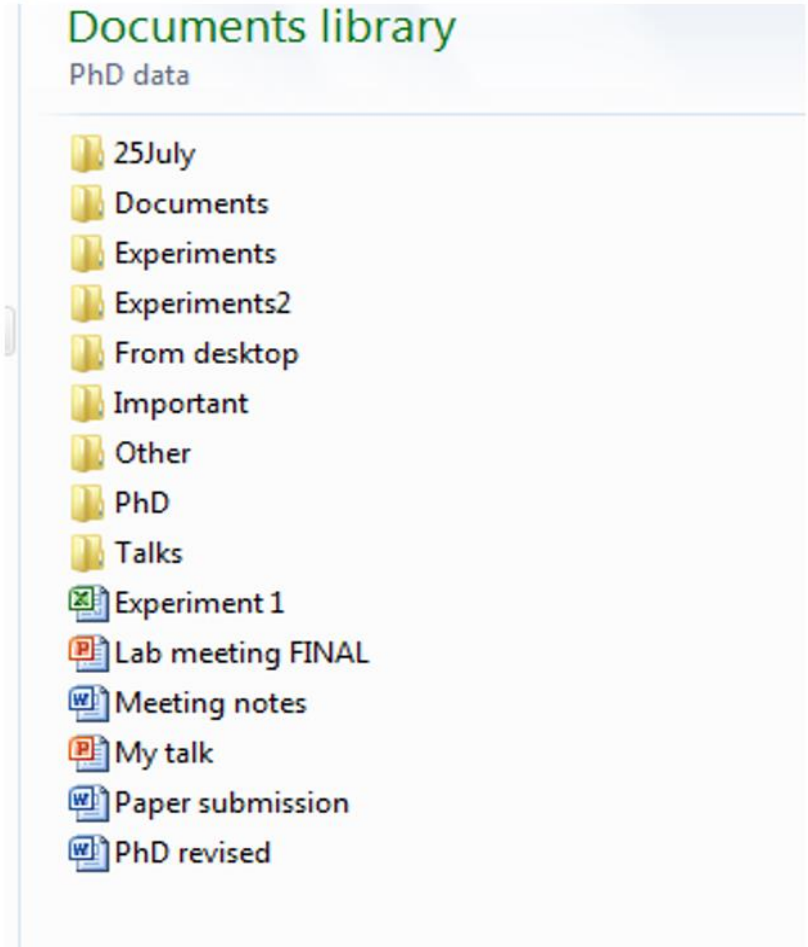
- Create maps of your samples
  - can be simple Excel spreadsheets
  - and keep them up to date!
- Reference your samples:
  - dates in notebooks
  - supplier's name/code
- Add any relevant notes
- Think about converting paper copies to digital

Research Data

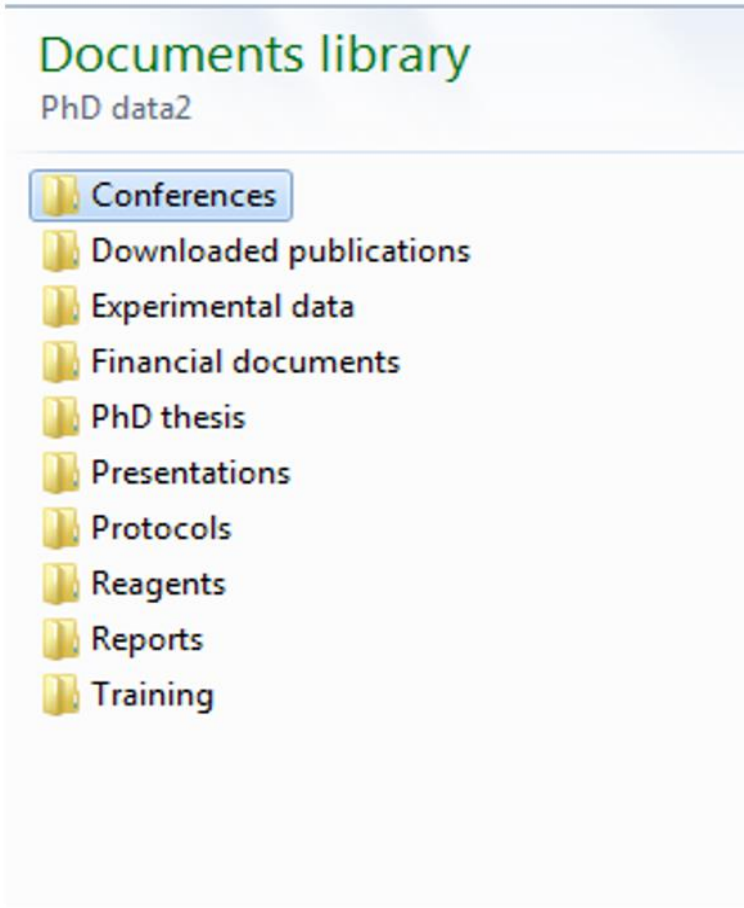
Data organisation

Which example is better, and why?

Example·A¶



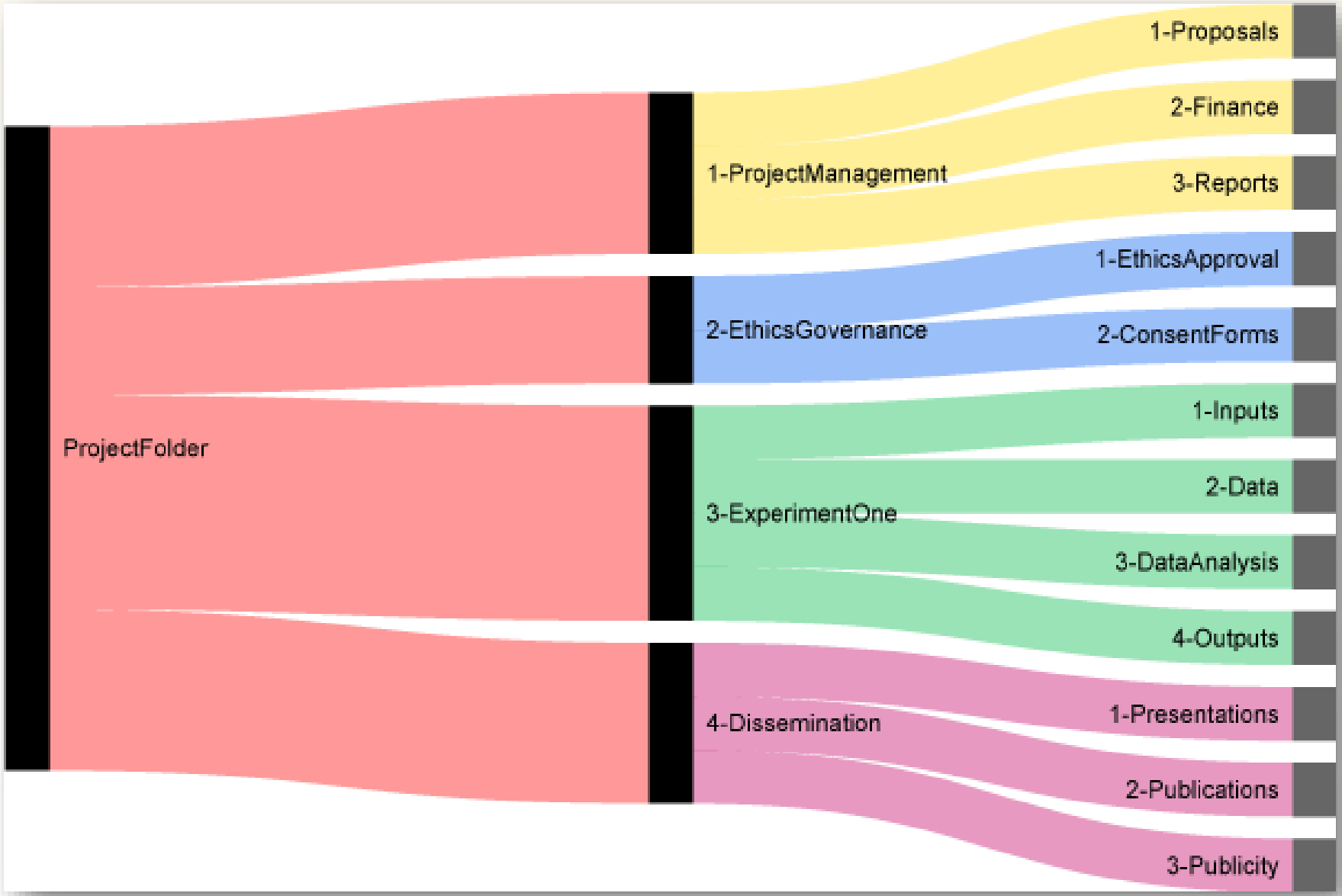
Example·B¶



Data organisation:

- Allow you to find files easily
- Meaningful to you and your colleagues
- Consistent

Research Data



Copyright: http://nikola.me/folder_structure.html

Research Data

File naming conventions – do they matter?

Copyright: http://10pm.com/

Research Data

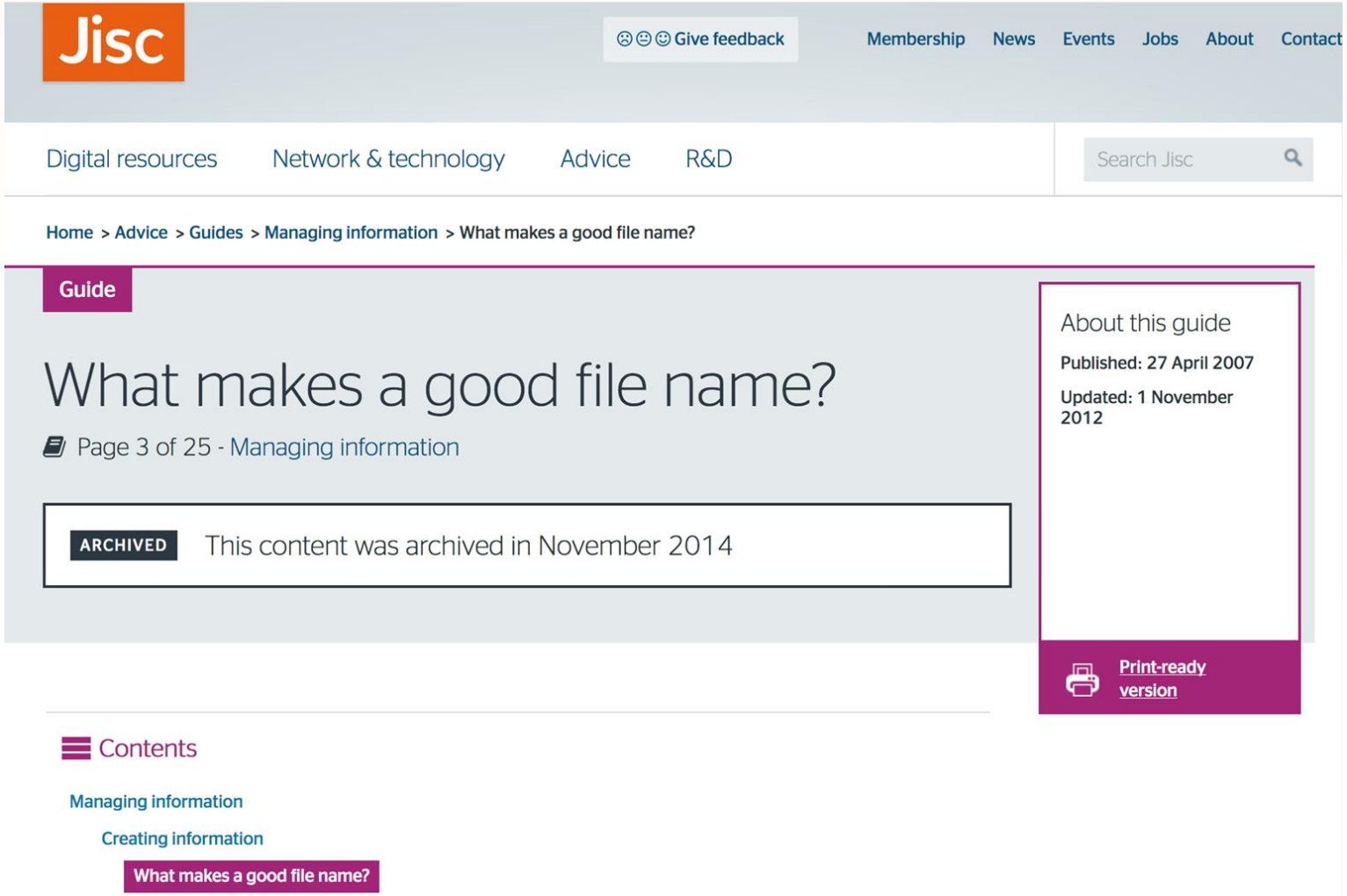
File naming conventions – do they matter?

In 3 years time would you know what these are?

Research Data

What do you think makes a good file naming convention?

File naming conventions



https://www.jisc.ac.uk/guides/managing-information/good-file-name

Research Data

File naming conventions

A good file name enables its creator and anyone else within the institution to **identify** its content and context and to make a **decision about its relevance** without having to open the file itself.

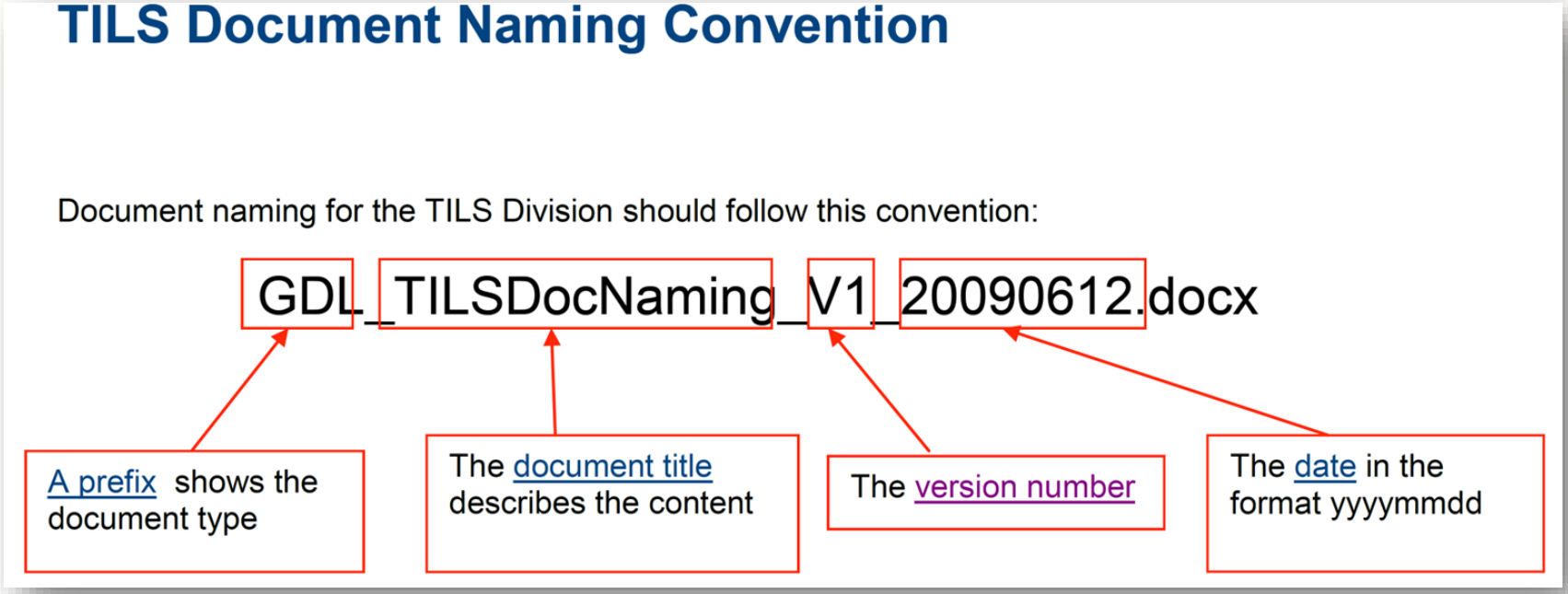
In order to achieve this a file name should be:

- **Objective** e.g. “Project members Jones Lab” / “Coding project collaborators 2018”
- **Meaningful** e.g. “Lib Cttee” / “Library Committee”
- **Concise** e.g. “Conference report and other thoughts from Vienna” / “2018 Vienna Conference Report”
- **Standardised** e.g. follow agreed standards for personal names, dates, types of information, external bodies etc.

https://www.jisc.ac.uk/guides/managing-information/good-file-name

Research Data

File naming conventions



http://www.data.cam.ac.uk/files/gdl_tilsdocnaming_v1_20090612.pdf

Research Data

README files

If your description is long you can write a short description for the data record and then a full description as a **README file**.

README files should contain:

- **General information** - title, authors, date of collection
- **File overview** - short description of the data each file contains and date it was created
- **Sharing information** - licence or restrictions placed on the data
- **Methodological information** - description of methods for data collection or generation, description of methods used for data processing
- **Data specific information** - variable list (including definitions) for tabular data, units of measurement, definitions for codes or symbols used to record missing data

Cornell University has excellent README file guidelines.

Write as a plain text file.

Research Data

README files

README - Notepad

File Edit Format View Help

```
README file for Cadwallader (2017) Research data supporting "Doubts about
How the Middle Horizon Collapsed (ca. A.D. 1000) and Other Insights from
the Looted Cemeteries of the Lower Ica Valley, South Coast of Peru". DOI:
10.17863/CAM.22272.

This dataset is made up of a number of files and folders. All the data was
collected in 2010 in two field seasons. The files/folders are as follows:

GPS_locations_of_site_perimeters.csv This file gives the GPS coordinates of
the limits of the sites recorded in 2010 and also mid points of some sites.
These were used to draw the maps of the sites presented in the associated
publication.

Photo_register_all_sites.csv This file gives contextual information to the
photographs contained in the zip folders. Contextual information includes:
site, sector (where applicable), date taken, GPS coordinates and altitude
(M.A.S.L) (when recorded), brief description of photograph.

Photographs_of_sites.zip This zip contains seven folders - one for each of
the sites discussed in the paper. Each folder contains photographs
illustrating the burial archaeology of that site. Some photographs include
images of human remains.
```

Research Data

Writing metadata - examples

Description

This contains supporting **data needed to reproduce the DNS simulations reported in the accompanying paper**. The files include source code (in Fortran 90/MPI) and input files.

Description

Onchip Andreev devices and Ballistic Josephson junctions fabricated, and **measured by the authors at the Cavendish Laboratory, University of Cambridge UK, in the period Jan 2016 to April 2017. The measurements were done at low temperature (50 to 800 mK)**. The experimental methods are described in the associated publication.

Description

This data contains the corresponding MATLAB©-code for the numerical examples in the conference proceedings paper 'Gradient descent in a generalised Bregman distance framework'. **Download the zip-file and extract it to a folder of your choice. Execute the 'setpath.m' file to add all relevant files to the MATLAB© path**, and switch to the folder 'Examples'. This folder contains a script named 'phasereconstruction.m' that will compute the numerical examples as presented in the paper. **A detailed explanation of the script can be found in terms of the HTML-file 'phasereconstruction.html' in the sub-folder 'Manual**‘.

Software

All calculations performed using the **development version of HANDE QMC (homepage: http://www.hande.org.uk/**). This will be reproducible using the publically available version of the HANDE QMC code after the next update (public github version: https://github.com/hande-qmc/hande)

Research Data

4. Managing personal and sensitive data

What are personal data?

"records or other information that, on their own, or linked with other data or information in the possession of the data controller, can reveal the identity of an actual living person"

Data Protection Act (1998)

'personal data' means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person;

Art. 4 EU GDPR Definitions

(new law from 25th May 2018)

Research Data

How to handle personal data?

- Don’t collect it!
- Gain informed, preferably open and written, consent. See UK Data Service for examples.
- Anonymise data
  - Remove identifiers
  - Aggregate results
  - Generalise a variable
  - Remove outliers
- Use managed access repositories
- There are exemptions for research but you must add more detailed information to participant information sheets, and must not derive individual outcomes (e.g. drug treatment for specific person) but look at whole group

Research Data

Guidance

University Research Ethics website:

https://www.research-integrity.admin.cam.ac.uk/research-ethics

University GDPR website:

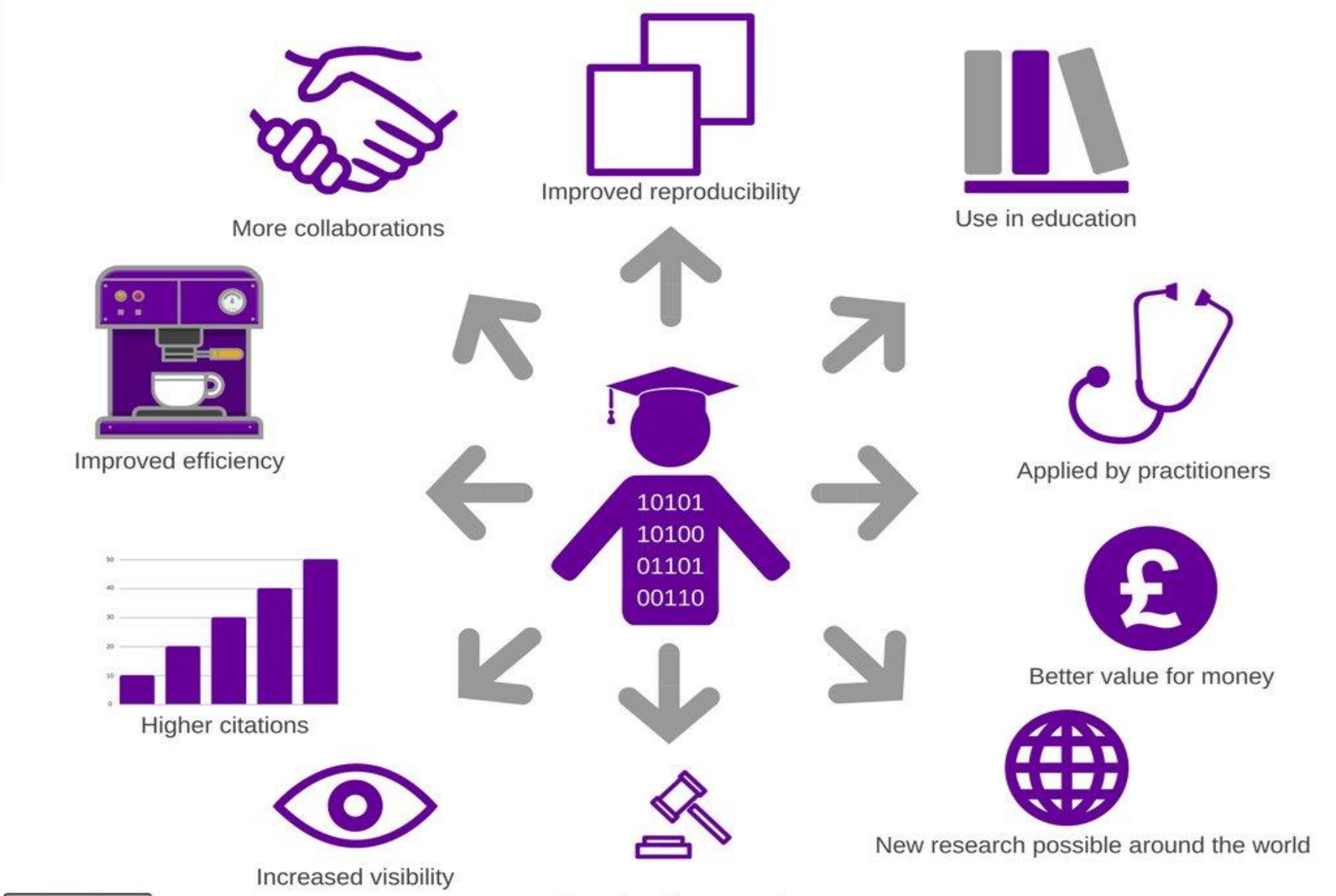
https://www.information-compliance.admin.cam.ac.uk/data-protection/general-data-protection-regulation

This is covered in more detail in our advanced course – find out more later.

Research Data

5. Data sharing whys and hows

Sharing your research is A Good Thing



Rosie Higman

Inspired by Danny Kingsley and Sarah Brown

Open Access to research data

"Publicly funded research data are a public good (…), which should be made openly available with as few restrictions as possible…"

https://www.ukri.org/funding/information-for-award-holders/data-policy/common-principles-on-data-policy/

Write down 2-3 things that worry you about sharing your data openly

Open Access to research data

What if:

- Someone steals my idea
- It stops me from being published
- It's too much work
- It's my data and I don't want to share it
- I have to pay for it

Katie Hughes

Research Data

www.data.cam.ac.uk/funders

Funder names arranged alphabetically. Click on the hyperlink to see the full-length policy.

BBSRC **Read the policy**	Adherence to data management plan will be monitored and built into the Final Report score, which may be taken into account for future proposals. Research data that supports publications must be stored for 10 years. Grantholders are requested to capture and record data sharing activities, including details of where and how data have been shared, in the appropriate places on ResearchFish. Detailed guidelines about BBSRC requirements are available here. We have also discussed BBSRC policy directly with Michael Ball from the BBSRC. Our discussion and resulting clarifications of the BBSRC policy are published here.	June 2018
British Heart Foundation **Read the policy statement**	"Safeguards should be in place to respect the confidentiality of patients, while also ensuring that medical researchers can gain access to patient data within a secure environment."	June 2018
Cancer Research UK **Read the policy**	Any applicants who consider that the data arising from their proposal will not be suitable for sharing must provide clear reasons for not making it available. Investigators carrying out research involving human participants must ensure that consent for data sharing is obtained from participants; research data should be anonymised prior to sharing. Research data should be available for sharing for a minimum period of five years from the end of a research grant. CRUK also issued a list of FAQ on data sharing. We have also invited JCRUK to discuss their data sharing requirements with researchers at Cambridge. We have published blog posts	June 2018

Key policy highlights

Date the policy was last checked or updated.

Research Data

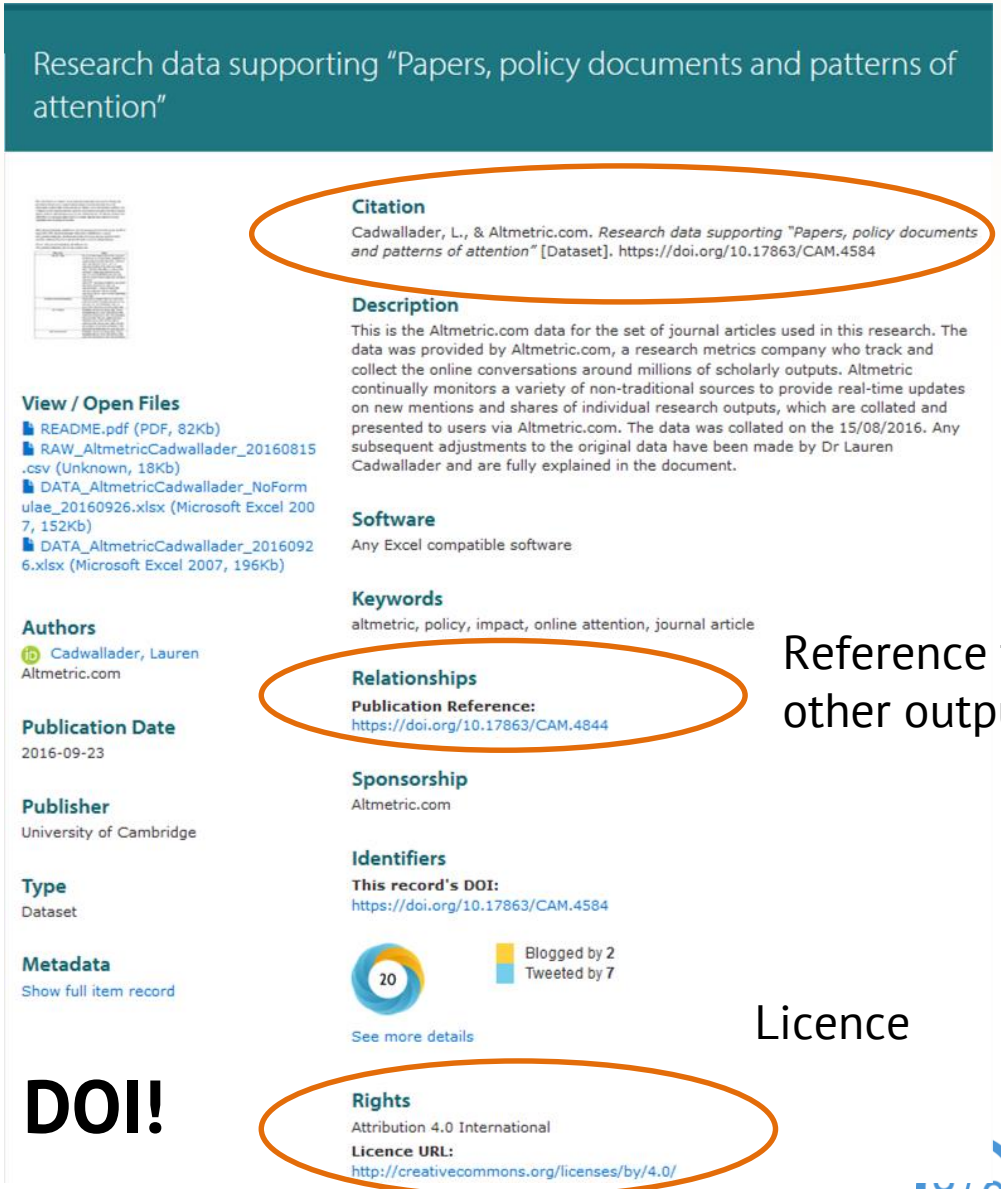
Cambridge data repository

www.data.cam.ac.uk

We will check the data, upload it into the repository and send a link to it

Research Data

And each submission gets its own record



Citation

Reference to other outputs

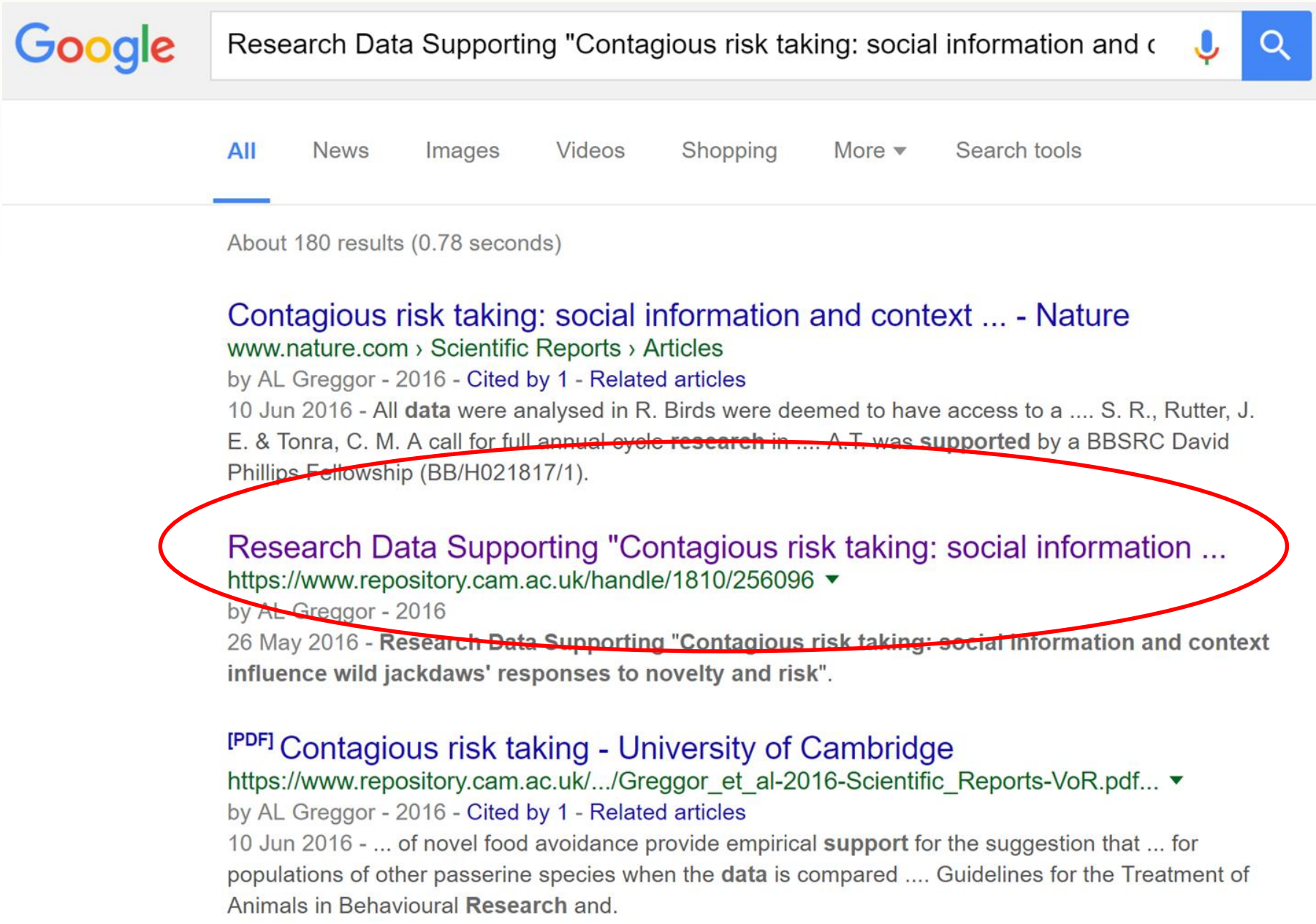
Licence

DOI!

https://doi.org/10.17863/CAM.4584

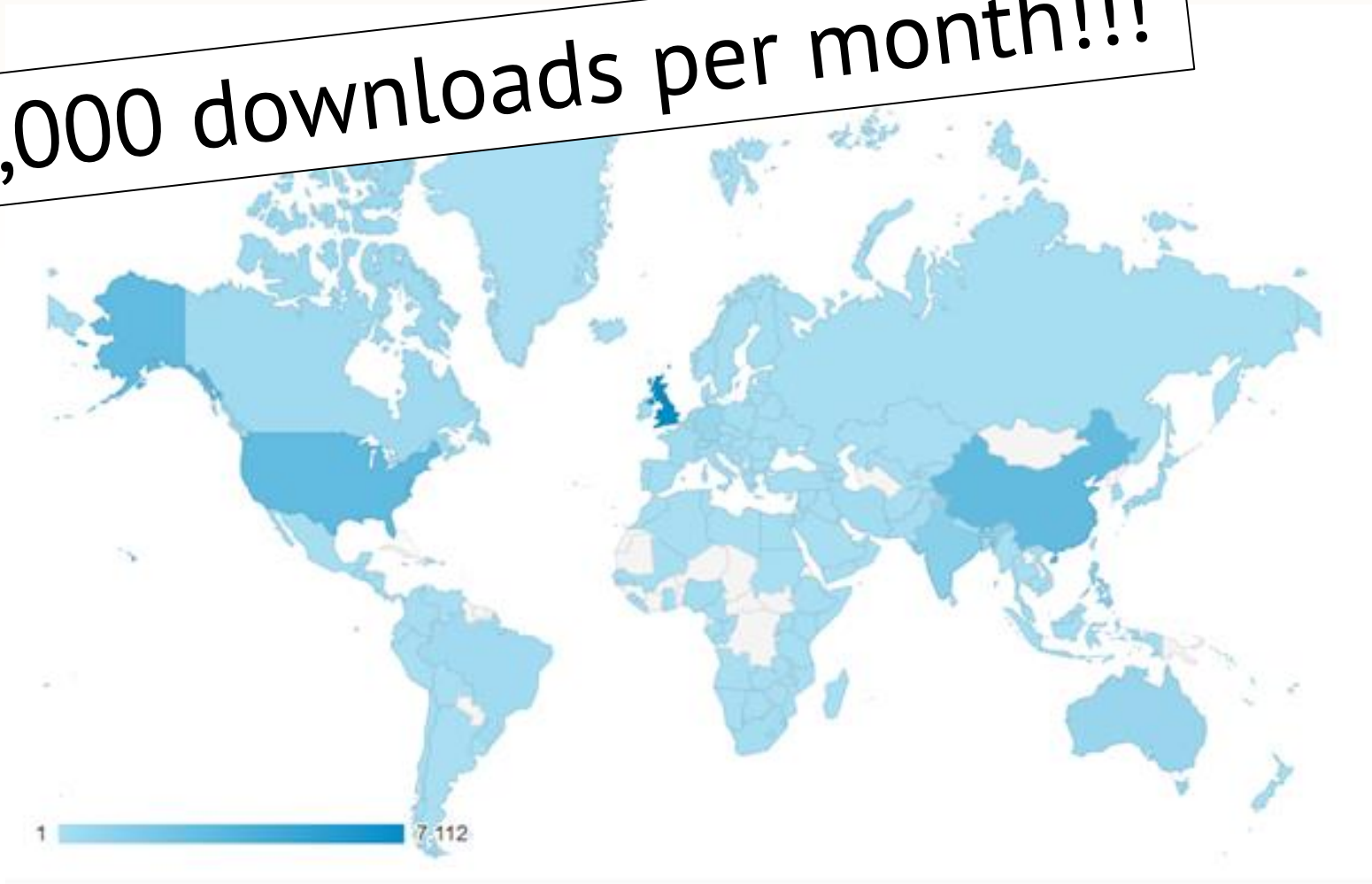
Research Data

Google indexes the repository!



Average numbers of visits

84,000 downloads per month!!!



~34,000 visitors per month

Research Data

Cambridge support for data management and sharing

Research Data

Research data services provided by the Cambridge data team:

- Data repository
- Data Management Plan checking
- Advice on funders' policies
- Training on research data management
- Online information
- On demand data management consultancy

Research Data

www.data.cam.ac.uk

Training and support

03 SEP — **Effective strategies for managing your research data (beginners session)**

Monday, 3 September, 2018 at 10:00-12:00

8 Mill Lane, Lecture Room 5

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05 SEP — **Effective strategies for managing your research data (advanced session)**

Wednesday, 5 September, 2018 at 14:00-16:00

8 Mill Lane, Lecture Room 10

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11 SEP — **Reproducing and reusing research code: lunch and learn with Code Ocean**

Tuesday, 11 September, 2018 at 12:30-13:30

Postdoc Centre, Newman Library @ Biomedical Campus

www.osc.cam.ac.uk/events

Research Data

Researchers and students can now not only make their code and data available for their academic papers, but also enable others to reproduce the results with a single-click.

Code Ocean is an easy-to-use executable repository and reproducibility platform that facilitates replication and reuse of research code. This demo will provide an overview of the Code Ocean platform and explore benefits such as:

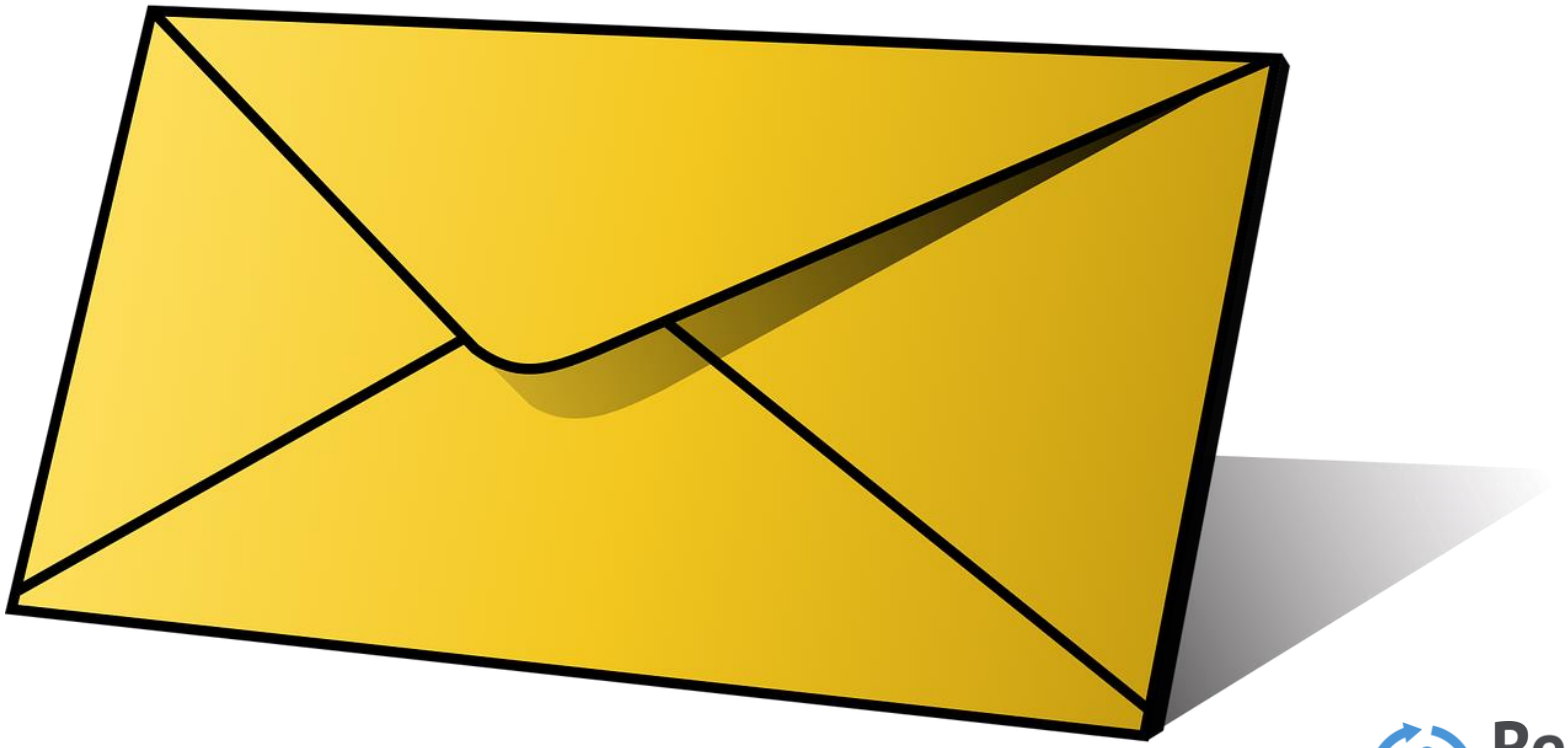
- **preservation** - code will work today, tomorrow, next week, next year
- **advanced tech** - suite of tools which follow reproducibility best practices
- **impact** - enable easy reuse of code to extend research
- **collaboration** - code is easy to share and discover.

Lunch will be provided during the session, which will include a demo and discussion.

You may find it useful to bring your own internet-enabled device to the session

Research Data

Your data management resolution for the next month



Research Data

Your data management resolution for the next month

1. YOU (today)
   a) Address an envelope to yourself
   b) Write your data management resolution for the next month on a "post-it note" and place it in the envelope
   c) Write today's date on the front of the envelope

2. US:
   a. We will send you the envelope on 3 October

Research Data

Want to enhance your basic RDM skills?

Attend our advanced course!

https://www.training.cam.ac.uk/osc/event/2623409

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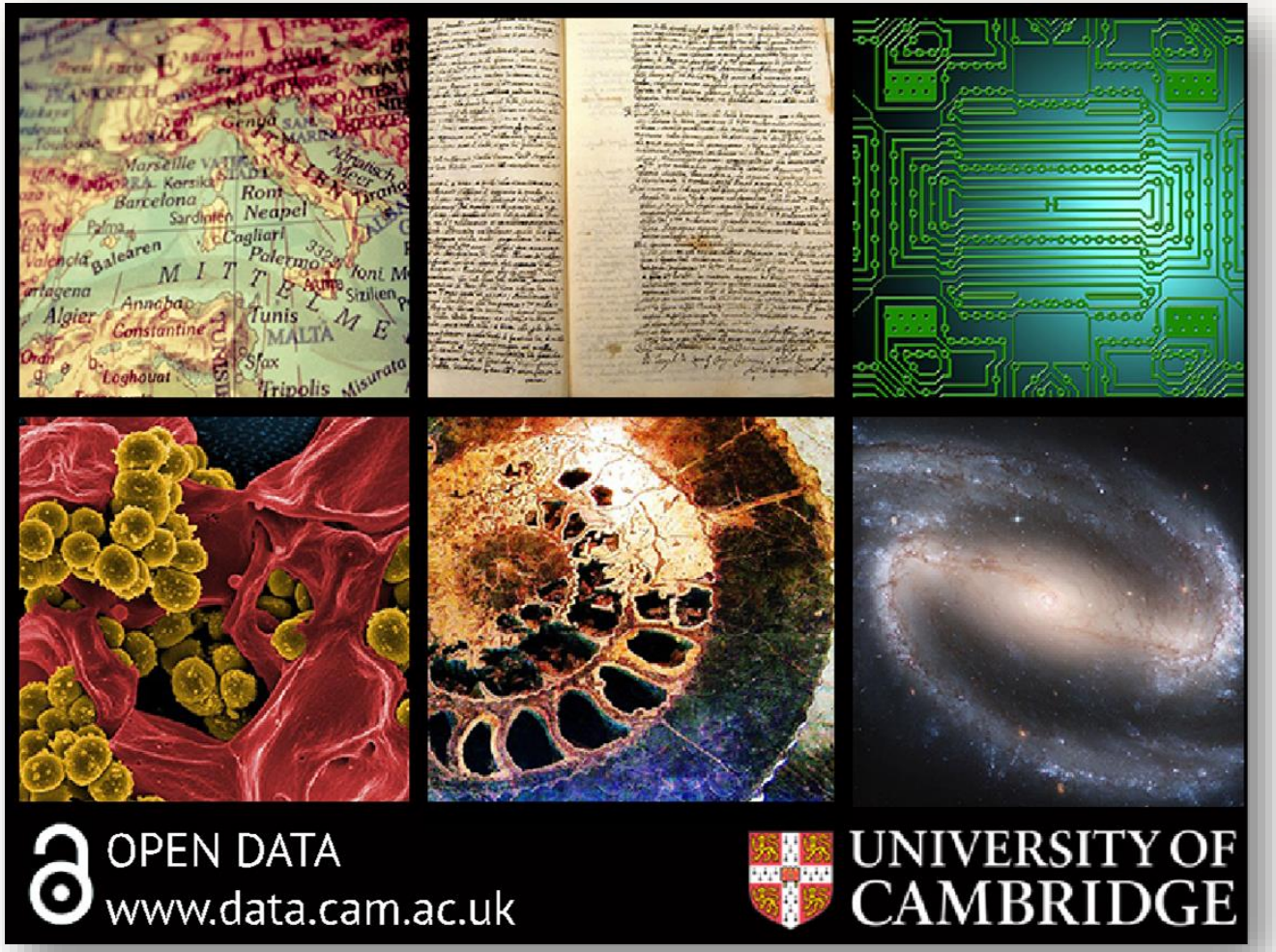
Take-home message:



www.data.cam.ac.uk
info@data.cam.ac.uk

Research Data

Thank you

Enquiries about research data: info@data.cam.ac.uk

www.data.cam.ac.uk

@CamOpenData

Research Data